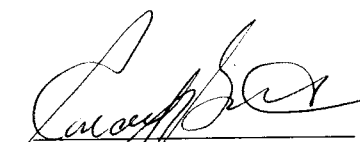


First Five-Year Review Report  
For  
Kim-Stan Landfill Site  
Selma, Alleghany County, Virginia

December, 2010

Prepared by:  
United States Environmental Protection Agency  
Region III  
Philadelphia, Pennsylvania

Approved By:

  
\_\_\_\_\_  
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Date:

12/3/10

## **List of Acronyms**

<b>ATSDR</b>	Agency for Toxic Substances and Disease Registry
<b>ARARs</b>	Applicable or Relevant and Appropriate Requirements
<b>BLRA</b>	Baseline Risk Assessment
<b>BOD</b>	Biological Oxygen Demand
<b>CERCLA</b>	Comprehensive Environmental Response, Compensation, and Liability Act
<b>CLP</b>	Contract Laboratory Program
<b>COC</b>	Contaminant of Concern
<b>COD</b>	Chemical Oxygen Demand
<b>EPA</b>	Environmental Protection Agency
<b>GPRA</b>	Government Performance Results Act
<b>HDPE</b>	High Density Polyethylene\
<b>LEL</b>	Lower Explosive Limit
<b>LMWWTP</b>	Low Moor Waster Water Treatment Plant
<b>MCL</b>	Maximum Contaminant Level
<b>MCLG</b>	Maximum Contaminant Level Goal
<b>NCP</b>	National Oil and Hazardous Substances Pollution Contingency Plan
<b>NPL</b>	National Priorities List
<b>O&amp;M</b>	Operation and Maintenance
<b>PCOR</b>	Preliminary Close Out Report
<b>PRP</b>	Potentially Responsible Party
<b>RA</b>	Remedial Action
<b>RAC</b>	Remedial Action Contractor
<b>RAO</b>	Remedial Action Objective
<b>RCRA</b>	Resource Conservation and Recovery Act
<b>RD</b>	Remedial Design
<b>RI/FS</b>	Remedial Investigation/Feasibility Study
<b>ROD</b>	Record of Decision
<b>RP</b>	Responsible Party
<b>RPM</b>	Remedial Project Manager
<b>SWRAU</b>	Site-wide Ready for Anticipated Use
<b>TAL</b>	Target Analyte List
<b>TCL</b>	Target Compound List
<b>VDEQ</b>	Virginia Department of Environmental Quality
<b>VDWM</b>	Virginia Department of Waste Management
<b>VOC</b>	Volatile Organic Compound

## Table of Contents

<b>List of Acronyms.....</b>	<b>2</b>
<b>Executive Summary.....</b>	<b>4</b>
<b>Five-Year Review Summary Form.....</b>	<b>5</b>
<b>I. Introduction.....</b>	<b>8</b>
<b>II. Site Chronology.....</b>	<b>9</b>
<b>Table 1: Chronology of Site Events.....</b>	<b>9</b>
<b>III. Background .....</b>	<b>9</b>
Physical Characteristics .....	9
Land and Resource Use .....	9
History of Contamination .....	10
Initial Response.....	10
Basis for Taking Actions .....	11
<b>IV. Remedial Actions .....</b>	<b>12</b>
Remedy Selection .....	12
Remedial Implementation.....	13
Operations and Maintenance.....	15
Institutional Controls .....	17
<b>V. Progress Since the Last Review .....</b>	<b>18</b>
<b>VI. Five-Year Review Process .....</b>	<b>18</b>
<b>VII. Technical Assessment .....</b>	<b>21</b>
<b>VIII. Issues, Recommendations and Follow Up Actions.....</b>	<b>25</b>
<b>IX. Protectiveness Statement.....</b>	<b>27</b>
<b>X. Next Review .....</b>	<b>27</b>
<b>Attachments.....</b>	<b>28</b>

## **Executive Summary**

The remedy for the Kim-Stan Landfill Superfund Site located in Alleghany County, Virginia, included the expansion of the Low Moor Waste Water Treatment Plant, a sewer line dedicated exclusively to leachate, a leachate collection trench and a multi-layer geomembrane cap over the landfill wastes. The Site achieved construction completion status with the signing of the Preliminary Close Out Report (PCOR) on August 3, 2009. This is the first five-year review for the Site. The trigger for this five-year review was the initiation of the Remedial Action on December 5, 2005.

The assessment of this five-year review found the remedy was constructed in accordance with the requirements of the Record of Decision (ROD). The site is considered protective in the short term. In order to achieve long term protectiveness, minor modification to the leachate collection trench must be completed to ensure that leachate within the trench is able to optimally flow and institutional controls must be implemented.

## SITE IDENTIFICATION

Site name: Kim-Stan Landfill Site

EPA ID: VAD077923449

Region: 3

State: VA

City/County: Selma/Alleghany

## SITE STATUS

NPL status: ☒ Final ☐ Deleted ☐ Other (specify) \_\_\_\_\_

Remediation Status (choose all that apply): ☐ Under Construction ☒ Operating ☐ Complete

Multiple OUs?\* ☐ YES ☒ NO

Construction completion date: 8 / 03 / 2009

Has site been put into reuse? ☐ YES ☒ NO

## REVIEW STATUS

Lead agency: ☒ EPA ☐ State ☐ Tribe ☐ Other Federal Agency \_\_\_\_\_

Author name: Anthony C. Iacobone

Author title: RPM

Author Affiliation: U.S. EPA - Region 3

Review period: 06/24/2010 to 12/05/2010

Date(s) of site inspection: 11/30/10

Type of review: ☒ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only  
☐ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead  
☐ Regional Discretion

Review number: ☒ 1 (first) ☐ 2 (second) ☐ 3 (third) Other(specify) \_\_\_\_\_

### Triggering action:

☒ Actual RA Onsite Construction at OU # \_\_\_\_\_ ☐ Actual RA Start at OU# \_\_\_\_\_  
☐ Construction Completion ☐ Previous Five-Year Review Report  
☐ Other (specify) \_\_\_\_\_

Triggering action date: 12/05/2005

Due date (five-years after triggering action date): 12/05/2010

## **Five-Year Review Summary Form, cont'd.,**

### **Issues**

1. Leachate is not freely flowing along the western leg of the trench due to an obstruction.
2. Leachate is not freely flowing along the main trench leg due to an obstruction.
3. Institutional controls have not been implemented.
4. Leachate has been detected in the vicinity of SW07.

### **Recommendations and Follow-up Actions:**

1. EPA will install a 12-inch diameter well with a submersible pump in the vicinity of TGV-2.  
2. Leachate will be pumped over the obstruction into the manhole pump station.
2. EPA will install a 12-inch diameter well with a submersible pump in the vicinity of TGV-6.  
6. Leachate will be pumped over the obstruction into the manhole pump station.
3. EPA will continue working with Alleghany County to implement an overlay district prohibiting disturbances to the cap and the construction of potable wells within the cap and a 200 foot buffer around the cap, extending northward to the Jackson River.
4. EPA will replace a leaking storm water line that is allowing leachate to leave the Site.

### **Protectiveness Statement:**

The site is considered protective in the short term. In order to achieve long term protectiveness, minor modifications to the leachate collection trench must be completed to ensure that leachate within the trench is able to optimally flow and institutional controls must be implemented.

### **GPRA Measure Review:**

As part of this Five-Year Review the GPRA Measures have also been reviewed. The GPRA Measures and their status are provided as follows:

#### **Environmental Indicators:**

Human Health: Current Human Exposure Under Control (HEUC)

Groundwater Migration: Contaminated Ground Water Migration Under Control (GMUC)

**Sitewide RAU:**

The Site is not yet considered Site-Wide Ready for Anticipated Use (SWRAU) but is expected to achieve SWRAU status on September 30, 2011.

**Other Comments**

No other comments

Kim-Stan Landfill Superfund Site  
Selma, Virginia  
First Five-Year Review

## I. Introduction

The purpose of the five-year review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and identify recommendations to address them.

The Agency is preparing this Five-Year Review report pursuant to CERCLA §121 and the National Contingency Plan (NCP). CERCLA §121 states:

*If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five-years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The Agency interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) states:

*If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five-years after the initiation of the selected remedial action.*

The United States Environmental Protection Agency (EPA) Region III, conducted the five-year review of the remedy implemented at the Kim-Stan Landfill Superfund Site in Selma, Virginia. This review was conducted by the Remedial Project Manager (RPM) for the Site from June 2010 through December 2010. This report documents the results of the review.

This is the first review for the Kim-Stan Site. The triggering action for this statutory review is the start of the Kim-Stan Remedial Action, as shown in EPA's CERCLIS database as December 5, 2005. The five-year review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure



## II. Site Chronology

**Table 1: Chronology of Site Events**

Event	Date
Kim-Stan Landfill Operations	1972-1990
VA Department of Waste Management Stabilization activities	1990-1993
Final Listing on the EPA National Priorities List	07/22/1999
Remedial Investigation/Feasibility Study	2000-2002
Record of Decision selecting remedy is signed	09/27/2002
Remedial Action	12/05-08/09
Preliminary Close Out Report	08/03/2009

## III. Background

### Physical Characteristics

The Kim Stan Landfill Site (Site) is a former municipal/industrial solid waste landfill located on approximately 24 acres in Selma, Virginia, a small town located west of Clifton Forge, Alleghany County, Virginia (see Figures 1 and 2). Prior to the initiation of the Remedial Action, the Site was generally described as an elongated mound 50 to 85 feet above Route 696 with a relatively flat top that slopes from the side of the mountain to the south, northward to Route 696. The southern border of the landfill is the north slope of the forested Rich Patch Mountains, which is part of George Washington National Forest. Access to the landfill was limited by a 7-foot, chain-link fence topped with barbed-wire on the north and west side. Currently, vehicular access is restricted by a wooden fence that blends in with the surrounding locale.

### Land and Resource Use

The Kim Stan Landfill operated from November 1972 to May 1990. The landfill is not currently being used for industrial, commercial, or residential purposes. Adjacent properties in the area are commercial/industrial and include a sawmill to the east, a heavy equipment repair

shop to the west, and to the north (across Route 696) a historic church and cemetery beyond which the CSX railroad yard expands to the east.

The landfill may be entered through the sawmill property during business hours only. No buildings are present at the landfill. Structures present include a stormwater pond outlet in the northeast corner of the property, a subterranean force main pump station to the northwest and a electrical junction that controls the leachate system adjacent to the pump station.

Residents in this area do not rely on groundwater as their source of drinking water. There are no residential properties downgradient of the landfill that would be impacted by the very limited amount of groundwater contamination that has migrated from the landfill property. Future use of the groundwater in this area would be limited in accordance with the institutional controls which are part of the selected remedy.

## **History of Contamination**

During landfill operations, an estimated 860,000 tons of wastes were placed in the landfill. Of this amount, 725,000 tons, consisting of out-of-state refuse collected primarily from commercial sources, was buried in the landfill during the last 18 months of operation at rates which approached 2,000 tons per day. The original owners, Jack Kimberlain and H. R. Stancil, operated the landfill under permit No. 82 issued by the Virginia Department of Health. The Site was permitted to receive both municipal and industrial waste. In November 1972, landfill operations began with the disposal of municipal garbage and household debris. Most of the municipal waste that was accepted was from Alleghany County. Beginning in October 1978, the landfill accepted industrial waste on a limited basis.

In 1988, Shelcy Mullins, Sr., Jerry W. Wharton, William Stover, and James Taylor purchased the landfill and continued to operate it as the Kim Stan Landfill until May 1990. An estimated 725,000 tons of waste, which included large quantities of industrial waste, were received at the landfill between November 1988 and May 1990. By early 1990, the landfill had reached a height of 50 to 85 feet. The landfill was shut down by court order on May 11, 1990, primarily due to outstanding operational problems.

## **Initial Response**

At the time the landfill ceased operations, the granular cover soil over the landfilled material was less than six inches in thickness. From May 1990 through January 1993, the Virginia Department of Waste Management (VDWM) and the Virginia Department of Transportation conducted various stabilization activities that included placement of 26,000 cubic yards of intermediate soil cover, installation of stormwater management and erosion control features, deactivation of the leachate pumping system, and off-Site disposal of an estimated 400,000 gallons of leachate.

In June 1991, the Virginia Department of Health, Bureau of Toxic Substances, performed a Preliminary Health Assessment for the Site. The report concluded that the Site posed an indeterminate public health threat, and recommended restricted public access and avoidance of on-Site/off-Site leachate and off-Site pond water, and called for the collection of various sediment, surface water, groundwater, and air samples. In May 1992, the EPA Region III Emergency Response Section performed a Site assessment that included the collection of leachate samples, a pond water sample, and a monitoring well sample. The results were submitted to the Agency for Toxic Substances and Disease Registry (ATSDR) for review. ATSDR concluded that the leachate did not pose a threat to human health. No further action was considered at that time.

In January 1993, at the request of the VDWM, CH2M HILL commenced a comprehensive investigation at the Site, the findings of which were included in a 1993 report entitled "Ground Water Contamination Assessment and Required Final Closure Action." The study included the installation of wells, an extensive geologic and hydrogeologic assessment, landfill delineation, and an initial off-Site assessment.

In 1996, researchers from the Dabney Lancaster Community College published a report entitled "Possible Effects of Leachate from the Kim Stan Landfill on the Macro Invertebrate Populations in the Jackson River and Unnamed Stream, Alleghany County, Va." The report concluded that the waterway down gradient from the Site, and possibly the Jackson River itself, had been adversely affected by the leachate.

In July 1997, a second EPA Site Inspection concluded that significant amounts of leachate, as well as contaminated groundwater and surface water runoff discharging from the Site, presented environmental concerns.

EPA proposed the Kim Stan Landfill Site for inclusion on the CERCLA National Priorities List (NPL) on April 23, 1999, and added the Site to the NPL on July 22, 1999 (NPL status authorizes EPA to spend Superfund monies to implement remedial action at a site). In February 2000, EPA initiated a Remedial Investigation and Feasibility Study (RI/FS) which was completed in March 2002. The RI/FS identified the nature and extent of contamination, fate and transport of contaminants, and the risk posed by the Site to human and ecological receptors, and identified options to address the contamination found at the Site.

## **Basis for Taking Actions**

In February of 2000 EPA initiated a RI/FS which was completed in March of 2002. The study concluded that conditions at the Site posed a potential threat to human health and the environment, mainly related to leachate discharges to the groundwater and surface water.

Contaminants at the Site are attributable to past disposal and operational practices at the Kim Stan Landfill. Hazardous substances that were directly deposited into the landfill or released within the landfill waste mass have migrated vertically into the shallow groundwater or laterally with the leachate flow. The rate of migration has likely varied with the chemical-physical properties of the released contaminants. Upon entering the groundwater system, contaminants have been transported downgradient in groundwater. Contaminants in the leachate remained in the subsurface leachate pool or shallow groundwater or entered the surface water through leachate seeps. Once in the surface water, contaminants migrated to the surface soils around the leachate seeps and to the sediments within surface water bodies. Chemical data collected from the Site indicates that contaminants that have migrated to groundwater have been confined to the shallow groundwater in the vicinity of the northern edge of the landfill and the area of Route 696. Constituents that migrated to the leachate have been concentrated in the leachate pool located at the northern boundary of the landfill waste mass. Low concentrations of constituents have also been identified in the surface water sediments.

According to the baseline risk assessment (BLRA) and the ROD the following chemicals of concern in groundwater, channel sediments, floodplain sediments, surface water and leachate present an unacceptable risk to human health and the environment at the Kim-Stan Landfill Site:

- a volatile organic compound (vinyl chloride) and,
- inorganic elements and metals (arsenic, iron, manganese, thallium).

## **IV. Remedial Actions**

### **Remedy Selection**

EPA issued a ROD for the Kim-Stan Landfill Site on September 27, 2002. Implementation of the Remedial Action was initiated on December 5, 2005.

Remedial Action Objectives (RAOs) were developed as a result of data collected during the Remedial Investigation to aid in the development and screening of remedial alternatives to be considered for the ROD. The RAOs for the Kim-Stan Landfill Site are as follows:

- prevent direct contact with and migration of the landfill waste;
- mitigate production and uncontrolled release of landfill gases;
- mitigate production and uncontrolled release of leachate; and
- restore groundwater quality through source control.

The major components of the remedy selected in the ROD are:

- Consolidation of landfill wastes visible at the surface outside the landfill property boundary into the landfill.
- Installation of a leachate collection system (trench and barrier wall) which shall prevent the migration of leachate from the landfill property and contain such leachate within the landfill property boundary in a manner that will allow for removal and treatment of the leachate at an off-site facility.
- Installation of piping and associated equipment to convey the leachate to the Low Moor Waste Water Treatment Plant (LMWWTP) for treatment.
- Performance of upgrades to the LMWWTP to facilitate adequate treatment of collected landfill leachate.
- Conveyance of collected landfill leachate to the LMWWTP and treatment of the leachate.
- Installation of a multi-layer cap atop the landfill that shall reduce, to the maximum extent practicable, the infiltration of water into the waste and the resulting production of leachate and groundwater contamination.
- Routine monitoring of groundwater to document progress in meeting the groundwater performance standards and to determine the need for continued limits on groundwater use.
- Implementation of institutional controls to protect the integrity of the multi-layer cover, leachate collection system and other remedy components on the Site property, and to prevent the use of contaminated groundwater until the performance standards are achieved.

## **Remedial Implementation**

Following the signing of the ROD in September of 2002, EPA initiated a Remedial Design (RD) for the site in December of 2002. The design was completed by EPA Remedial Action Contractor (RAC) Tetra Tech, Inc. in September 2003.

The Kim-Stan Landfill Site Remedial Action (RA) was implemented in three separate contracts: Landfill Element, Leachate pipeline Element, and Low Moor Wastewater Treatment Plant (LMWWTP) Upgrade Element. The benefit to implementing the project in three separate contracts was to provide the opportunity for the most competition, ensuring the most competitive price to the EPA. This approach also allowed the EPA the most flexibility to implement the project due to funding constraints. The three main construction projects for the Site are as follows: The first and second projects commenced on December 5, 2005 and were completed in September 2006. They included:

- Project No. 1 – Low Moor Treatment Plant Upgrade: An upgrade of the Low Moor Waste Water Treatment Plant (LMWWTP) was implemented to increase the capacity of the plant to handle additional wastewater flow from the landfill (initiated in December 2005 and completed in October 2006).
- Project No. 2 – Leachate Pipeline and Sewer Upgrade: Included installation of a pipeline to convey leachate from the landfill to the Alleghany County sewer system, as well as an upgrade to the county sewer system to handle additional flow from the landfill (initiated December 2005 and completed in May 2007).
- Project No. 3 – Landfill Capping and Leachate Collection System: Include installation of a multi-layered landfill cap, leachate collection trench, and other engineering controls at the landfill site for further long-term protection of the environment (initiated in August 2007, substantially complete in July 2009, final completion pending).

Project 1, the LMWWTP upgrade, increased the capacity of the plant by 250,000 gallons. This allows it to handle an average of 30,000 gallons per day of leachate discharged from the Site. The Kim-Stan landfill leachate comprises approximately 12% of the average daily influent to the treatment plant.

Project 2, installation of a 2-inch leachate pipeline approximately 2.5 miles in length and sewer upgrade consisting of 2 new pump stations; 1 upgraded pump station 4,300 feet of force main pipeline and 3,700 feet of gravity pipeline. The line is from the landfill to a pump station; from the pump station, it runs directly to the LMWWTP. The pipeline is used solely for leachate conveyance and does not tie into any of the existing sewage networks in the Low Moor area. This portion of the remedy is performing as designed and has had no issues with the exception of occasional periods of low flow related to pipeline obstructions. Once the lines are cleaned, flow returns to normal levels.

EPA mobilized on-site to implement the third project on May 13, 2008. This project, landfill capping and leachate collection system, comprised the largest portion of the overall Remedial Action. In terms of both financial and logistical resources it comprised over 80% of the project. This portion of the remedy was comprised of the following elements;

- Site preparation and selective demolition.

- Site excavation, relocation and grading.
- Construction of a leachate collection trench/barrier wall along the north, and partial west and eastern sides of the landfill.
- Construction of an engineered 22.16 acre multi-layer landfill cap.
- Vegetative cover, landscaping and access roads.
- Stormwater management features.
- Construction of landfill gas vents and perimeter soil gas monitoring wells.
- Construction of a leachate collection, pretreatment, and transfer system, including a trench pump station, force mains, engineered wetlands ponds and an aeration channel for leachate pretreatment; and
- Rehabilitation of existing monitoring wells and construction of new monitoring wells to facilitate long term monitoring of the groundwater at the site.

All projects and components of the Remedial Action are functioning in accordance with the ROD. However, during shake down testing, low flow was observed in the central and western portions of the trench. While the trench performs as designed, the low flow situation is not acceptable, particularly during periods of drought when low groundwater flow is present. A plan is being developed to remedy this situation and this issue will be added to the recommendations section of the five-year review.

## **Operations and Maintenance**

Since the signature of the PCOR on August 3, 2009, EPA has had three sampling events and began a shakedown period to ensure the remedy is functioning as designed. During this shakedown period, the following deficiencies were discovered;

- The 6-inch perforated High Density Polyethylene (HDPE) drain line was incorrectly placed. The perceived location of the drain line was based on soundings measured with trench cleanouts.
- The 6-inch perforated HDPE drain line contained sediment and obstructions as observed during jetting. As a result, leachate is not being efficiently conveyed through the line.
- Flexible stainless steel connections were used to tie drain lines into the manholes. These connections collapsed, kinked or otherwise became obstructed on the western side of the manhole since no flow was observed coming into the manhole

from the western leg drain line. Also, refusal was encountered approximately 1.5 feet into the drain line during an attempt to jet this line from the manhole itself.

- As confirmed by pumping conducted at the manhole to remove accumulated sediments, the drain line was installed 1.8 feet higher than designed.
- Based on water level data collected from within the trench and at the manhole, water elevations within the western leg of the trench had remained essentially unaltered as leachate levels within the manhole were significantly lowered by pumping. These water levels may be attributable to:
  - a. Mounding of groundwater and leachate behind the trench barrier, where the volume entering the trench is greater than the pumping removal rate.
  - b. Suspected cave-ins during trench installation along the western leg, interrupting the continuity of the gravel fill. EPA's RACs contractor reviews of construction logs revealed sloughing of trench sides behind the geotextile fabrics between TGV-1 and TGV-2. (figure 3)

### **Recommended Improvements**

The data generated by the additional investigations during the shakedown period indicated that the trench was not functioning as designed with respect to the efficient conveyance of leachate to the manhole, primarily related to the improper construction of the drain line that was designed to be placed at the bottom of the trench. As a result, the leachate collection system is not collecting as much leachate as designed, nor is it collecting leachate from the entire leachate collection system as designed. Consequently, the following measures are recommended to address construction deficiencies:

**West Trench Leg:** One 12-inch diameter extraction well will be installed at a location near TGV-2 (between TGV-1 and TGV-2 see Figure 3 for an as-built map) in the trench to a depth equal to the bottom of the trench. This well will be equipped with a submersible pump with a design flow rate of 5 to 10 gpm, with the well discharge directed via force main back into the trench at or near the manhole pump station. The new well will provide enhanced drainage from the west trench leg to compensate for the low permeability zone encountered between TGV-2 and the manhole.

**Main Trench Leg:** One 12-inch diameter extraction well will be installed at a location near TGV-6 in the trench to a depth equal to the bottom of the trench. This well will be equipped with a submersible pump with a design flow rate of 5 to 10 gpm, with the well discharge directed via force main back into the trench at or near the manhole pump station. This well will provide enhanced drainage from the eastern side of the landfill to compensate for the lack of drain pipe function along a portion of the main trench leg.



Currently, these repairs are scheduled to begin on or about December 10, 2010 with an expected duration of 4 to 6 weeks. EPA anticipates that the deficiencies will be corrected by the end of January and the Remedial Action will be operating at peak efficiency with respect to the leachate collection trench.

Ongoing Operations and Maintenance is performed by Allegany County and the EPA. EPA is currently responsible for all aspects of the project from the landfill to the first pump station. Alleghany County is responsible for all O&M from that point to the LMWWTP. As of this writing EPA does not have a breakdown of O&M costs as the project is still in the Remedial Action Phase. According to the Remedial Design, O&M costs will average \$262,457 over the first five-years. Typical O&M activities include cleaning of leachate sewage lines and monitoring of groundwater. A complete list of O&M activities can be found in the June 2007 and June 2010 Operations and Maintenance Manuals for the Site.

## **Institutional Controls**

The September 27, 2002 Record of Decision for the Site specifies the following Institutional Controls;

- (a) Institutional controls shall be implemented to protect the integrity of the multi-layer cover, leachate collection system, and other remedy components on the Kim Stan Landfill property. Such controls shall remain in place for as long as the multi-layer cover, leachate collection system, and other remedy components are required to be operated and maintained. The institutional controls shall prevent activities which could interfere with the operation and maintenance, function, or the integrity of the remedy.
- (b) In addition, institutional controls shall be implemented at the landfill property, within a 200 foot buffer around all sides of the landfill property, and between the northern edge of this buffer-enlarged area and the Jackson River to prevent use of groundwater for drinking, bathing, or cooking until the groundwater performance standards are attained. The groundwater performance standards are the more stringent of:

- non-zero Federal Maximum Contaminant Level Goals ("MCLGs");
- Federal Maximum Contaminant Levels ("MCLs");
- State MCLs; and
- existing groundwater standards promulgated by Virginia

adjusted downward (more stringent) as necessary to ensure that the cumulative effect of contamination in groundwater will not result in a cancer risk greater than 1 in 100,000 or a Hazard Index greater than 1.0, for thallium, arsenic, and vinyl

chloride, provided that the performance standard for any such contaminant shall not be below the background concentration.

The selected institutional controls have not been implemented. Alleghany County land records reflect that Kim-Stan, Inc. owns the landfill portion of the Site. EPA's investigation reveals that this entity no longer exists and that no one is available to enter into discussions with EPA to voluntarily restrict use of the property to protect the remedial action components. In addition, there are numerous properties included in area requiring groundwater use restrictions. EPA is currently investigating the means by which both sets of institutional controls can be efficiently implemented at the Site.

*Institutional controls would be implemented (1) at the landfill property to prohibit excavation and other activities that would adversely impact or disturb the multi-layer cap, and (2) at the landfill property, within a 200-foot buffer around all sides of the landfill property, and between the northern edge of this buffer-enlarged area and the Jackson River to prevent use of groundwater for drinking, bathing, or cooking until the groundwater performance standards are attained.*

EPA is currently working with Alleghany County, Virginia to implement an overlay district containing the areas and restriction specified in the ROD. This approach was chosen due to the abandoned status of the landfill. There is currently no viable owner of the landfill, making a conventional deed restriction impossible. EPA anticipates that this overlay restriction will be in place by March 31, 2011. This item will be added to the Five-Year Review recommendation.

## **V. Progress Since the Last Review**

This is the first five-year review for the Kim-Stan Landfill.

## **VI. Five-Year Review Process**

### **Administrative Components**

Representatives of the VDEQ were notified of the initiation of the five-year review on June 24, 2010. The Kim-Stan Landfill five-year review team was led by Anthony C. Iacobone and included members from the Region III Technical Advisory staff with expertise in hydrology, risk assessment and toxicology. Tom Modena of VDEQ assisted in the review.

## Community Involvement

A notice was placed in the *Virginian Review* of the impending Kim-Stan five-year review on October 19, 2010. A follow up notice will be placed in the *Virginian* after the signature of the review notifying the community of the completion of the review.

No public meeting was held to notify the local community of the upcoming five-year review. EPA's last community meeting was sparsely attended (only one citizen attended) so the decision was made to not have an on-site meeting but rather to direct any concerned citizens to the RPM via the ad placed in the *Virginian Review*.

## Site Inspection

The Site was inspected on November 30, 2010. Anthony C. Iacobone, EPA's Project Manager and Thomas Modena, the VDEQ's Project Manager toured the Site. No issues with the physical condition of the remedial action system were noted.

## Document Review

This Five-Year review consisted of a review of relevant documents including the ROD, the PCOR, the RD and the three quarterly sampling reports generated to date.

In the course of examining historical documents for the Kim-Stan Landfill Site, EPA revisited the Applicable or Relevant and Appropriate Requirements (ARARs) that were listed in the 2002 ROD. The following ARARs from 2002 are currently applicable:

- Safe Drinking Water Act: Maximum Contaminant Levels and Maximum Contaminant Level Goals
- Virginia Waterworks Regulation
- Virginia Anti-Degradation Policy for Groundwater
- Resource Conservation and Recovery Act: Criteria for Municipal Solid Waste Landfills.
  - Groundwater Monitoring and Corrective Action
  - Closure and Post-Closure Care
- Virginia Solid Waste Management Regulations: Sanitary Landfills.
  - Groundwater Monitoring
  - Closure
  - Post Closure
  - Control of Decomposition Gases
  - Leachate Control System and Monitoring
  - Corrective Action
- Virginia Stormwater Management Regulations
- Executive Order 11990 (Protection of Wetlands); procedures on floodplain management and wetlands protection

- Virginia wetlands mitigation compensation policy

Many of these requirements contained provisions which were complied with during the implementation of the Remedial Action. At this point in the cleanup process, the primary remaining ARARs are the requirements relating to long term groundwater monitoring and the Maximum Contaminant Levels (MCLs) established pursuant to the Safe Drinking Water Act. EPA examines the MCLs listed in this Act and compares them to the data collected in the annual sampling event. EPA will rely on these standards to determine the points when clean up goals have been met and groundwater monitoring is no longer necessary.

## Data Review

Data for the Site is limited since there have only been 3 sampling events comprising of groundwater, leachate, surface water and landfill gas sampling since the Site achieved construction completion. It is also important to note; however, that the remedy chosen for this Site is a presumptive remedy for closures of municipal landfills. As such, there are no Remedial Action Objectives (RAOs) associated with reductions of contaminants, rather the RAOs are based on the premise of a containment remedy suitable for a former municipal landfill. As such, the following data review reflects a summary of overall Site conditions rather than a numeric breakdown to contaminant reduction.

**Groundwater Quality:** The site groundwater contains a variety of inorganics and low level organic compounds. The area immediately downgradient of the landfill, specifically in the vicinity of the well clusters MW-5, MW-6, MW-7 and LF-15 situated northeast of the landfill had the most frequent detections of organics, as well as elevated concentrations of iron, manganese, arsenic, ammonia, Biological Oxygen Demand (BOD), and Chemical Oxygen Demand (COD). The groundwater quality in this area is indicative of leachate impacts. These results are not surprising given the fact that there was an uncontrolled flow of leachate leaving the landfill for over 20 years. This area will be covered by the previously mentioned zoning overlay district to ensure that there are no potable uses of this groundwater.

**Leachate Conditions:** The leachate levels are currently well below the landfill cap throughout the Site, and based on the potentiometric surface, are flowing toward the leachate collection trench. Leachate water levels decreased an average of 0.7 feet site wide across the landfill. During the April – July 2010 sampling period (the latest report) 1,395,400 gallons of leachate were removed from the Site and conveyed to the LMWWTP for treatment. The leachate levels are expected to further decrease in certain areas as the landfill mass continues to drain after placement of the landfill cap.

**Leachate Quality/Engineered Ponds:** The leachate quality data from the July 2010 sampling report indicates that the ponds are causing a substantial reduction in all organic constituents as well as iron in the leachate collection trench effluent as it moves through the system. The leachate trench effluent remains a weak leachate in terms of BOD, COD, ammonia concentrations, and presence of organics but the ponds are further improving the leachate water quality prior to discharge to the Alleghany County system. Natural biotreatment of the effluent is occurring as of July 2010, but not yet on a large scale as the immature wetlands plants need several growing seasons to be fully effective for biotransformation of the leachate, especially with respect to ammonia.

**Landfill Gas Conditions:** There has been no evidence of excessive migration of landfill gases via the subsurface to monitoring points or structures located outside of the landfill cap and leachate collection trench area. Specifically, the utility structures (pull boxes), pump stations and most storm water conveyance features are currently free of potential landfill gases at concentrations that would pose a concern and further, do not require any additional health and safety measures beyond those already employed to ensure safe operations.

However, the general methane level and LEL levels measured at the Site were higher in July 2010 compared to April 2010. This is likely related to further reduction of leachate levels at the Site and an increase in landfill gas production associated with increasing ambient temperatures. The landfill gas levels will be closely monitored as part of landfill gas monitoring events.

**Surface Water Quality:** The number of surface seeps has decreased since the leachate collection trench has been operational. There is one surface discharge (SW07) that shows evidence of leachate. EPA will address this area by modifying the storm drains in the vicinity to prevent flow into this discharge. This work is expected to commence on December 10, 2010 and will eliminate the flow of leachate from this area. This redesign will be part of the Five-Year review recommendations.

Overall, the data reflects that the Remedial Action at the Site is achieving the Remedial Action Objectives listed in the ROD.

## **VII. Technical Assessment**

*Question A: Is the remedy functioning as intended by the decision documents?*

Yes, the ROD called for the following Remedial Action Objectives;

- prevent direct contact with and migration of the landfill waste,
- mitigate production and uncontrolled release of landfill gases;

- mitigate production and uncontrolled release of leachate; and
- restore groundwater quality through source control.

Current monitoring data indicates that landfill gases are minor and below levels that would call for protective measures. The landfill is capped, preventing direct contact and migration of waste as well as serving as a source control. Finally, the combination of the landfill cap and the leachate trench mitigate the production and uncontrolled release of leachate.

Institutional Controls are also required by the ROD. They are currently not in place but the achievement of the RAO's means that there is no current exposure to Site contaminants. In any event, IC's are expected to be in place by March 31, 2011.

*Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy still valid?*

#### Changes in Standards and TBCs

*Have standards identified in the ROD been revised, and does this call into question the protectiveness of the remedy? Do newly promulgated standards call into question the protectiveness of the remedy? Have TBCs used in selecting cleanup levels at the site changed, and could this affect the protectiveness of the remedy?*

Although the September 2002 ROD does not provide chemical specific clean up goals for groundwater, it does identify vinyl chloride, arsenic, iron, manganese and thallium as chemicals of concern (COCs). Several contaminants are compared to federal MCLs (vinyl chloride – 2 ug/L, arsenic – 10ug/L, and thallium – 2 ug/L , while MCLs are not provided for iron and manganese. The 2002 ROD Federal MCL standards are still current.

Manganese does not have a federal MCL therefore; a state derived secondary MCL of 50 ug/L is available. This secondary MCL is not health-based and may be difficult to achieve since 50 ug/l may exceed background concentrations of this naturally-occurring metal.

#### Changes in Exposure Pathways

*Has land use or expected land use on or near the site changed?*

No.

*Have human health or ecological routes of exposure or receptor been newly identified or changed in a way that could affect the protectiveness of the remedy? Are there newly identified contaminants or contaminant sources? Are there unanticipated toxic byproducts of the remedy not previously addressed by the decision documents? Have physical site conditions or the*

*understanding of these conditions changed in a way that could affect the protectiveness of the remedy?*

The major new route of concern would be vapor intrusion into local residences. Recently, EPA has become aware that in such situations, vapors from subsurface contamination can infiltrate buildings located on or near the contamination. The vapor intrusion pathway has been eliminated from investigation at the Kim-Stan site since no to low level VOCs have been detected in groundwater in the 2010 monitoring well sampling program.

#### Changes in Toxicity and Other Contaminants Characteristics

*Have toxicity factors for contaminants of concern at the site changed in a way that could affect the protectiveness of the remedy? Have other contaminant characteristics changed in a way that could affect the protectiveness of the remedy?*

Of the toxicity changes, some have increased while others have decreased, making it impossible to generalize about whether the risks would be higher or lower if recalculated today. Current toxicity values may change again in the coming years, and protectiveness is best assessed at the time when it is believed that groundwater cleanup has been achieved. Therefore, it is recommended that the groundwater risks be evaluated at the end of the remedy to ensure protectiveness at that time.

EPA Regional Screening Levels (RSLs, dated May 2010) were compared to groundwater monitoring results and the following contaminants failed screening based on the sampling date:

**January 2010** – vinyl chloride, beat-BHC, arsenic, iron, and manganese

**April 2010** – pentachlorophenol, bis(2-ethylhexyl)phthalate, benzo(a)anthracene, benzo(b)fluoranthene, arsenic, barium, chromium, cobalt, iron, manganese, and nickel

**July 2010** – heptachlor epoxide, arsenic, barium, cobalt, iron, nickel, and manganese

Based on these results, it appears contaminant concentrations are reducing with time. Since this is a containment remedy and all Remedial Action Objectives have been achieved, the Site is considered protective in the short term.

#### Changes in Risk Assessment Methods

*Have standardized risk assessment methodologies changed in a way that could affect the protectiveness of the remedy?*

There have been minor changes in EPA's risk assessment guidance since 2002. These include changes in dermal guidance, inhalation methodologies, exposure factors, and a change in the way early-life exposure is assessed for vinyl chloride.

All Remedial Action Objectives have been achieved and the remedy is considered protective in the short term.

Expected Progress towards Meeting RAOs

*Is the remedy progressing as expected?*

In general, it appears that the remedy is progressing as expected.

Have ROD standards been revised and call into question the protectiveness of the remedy? Do newly promulgated standards call into question the protectiveness of the remedy?

No

Do new or changed To Be Considereds affect the protectiveness of the remedy?

No

Have land uses or expected land uses changed?

No

Have routes of exposure or receptors been newly identified or changed in a way that could affect the protectiveness of the remedy?

No

Are there newly identified contaminants or contaminant sources?

No

Are there unanticipated toxic byproducts of the remedy not previously addressed by the decision documents?

No.

Have physical conditions or understanding of them changed so as to affect the protectiveness?

No

Have toxicity factors changed in a way that could affect the protectiveness?

No

Have standardized risk methods changed so as to affect the protectiveness?



No

Is the remedy progressing as expected?

Yes

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No

#### Technical Assessment Summary

The selected remedy for the Kim-Stan Landfill Site is progressing as expected. Data indicate that contaminants present in the landfill are slowly decreasing. However, since this is a containment remedy the primary concern is that contaminants are confined to the Site. The implementation of the RA has already achieved the RAOs listed in the ROD. The Site use has not changed and there are no receptors for any possible Vapor Intrusion.

## **VIII. Issues, Recommendations and Follow Up Actions**

Issue	Recommendations / Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness	
					Current	Future
Leachate is not freely flowing along the western leg of the trench due to an obstruction.	EPA will install a 12-inch diameter well with a submersible pump in the vicinity of TGV-2. Leachate will be pumped over the obstruction into the manhole pump station.	EPA	EPA	3/31/2011	N	Y

Leachate is not freely flowing along the main trench leg due to an obstruction.	EPA will install a 12-inch diameter well with a submersible pump in the vicinity of TGV-6. Leachate will be pumped over the obstruction into the manhole pump station.	EPA	EPA	3/31/2011	N	Y
Institutional Controls have not been implemented	EPA will continue working with Alleghany County to implement an overlay district prohibiting disturbances to the cap and the construction of potable well within the cap and a 200 foot buffer around the cap, extending northward to the Jackson River.	EPA	EPA	3/31/2011	N	Y
Leachate has been detected in the vicinity of SW07	EPA will replace a leaking storm water line that is allowing leachate to leave the Site.	EPA	EPA	3/31/2011	N	Y

## **IX. Protectiveness Statement**

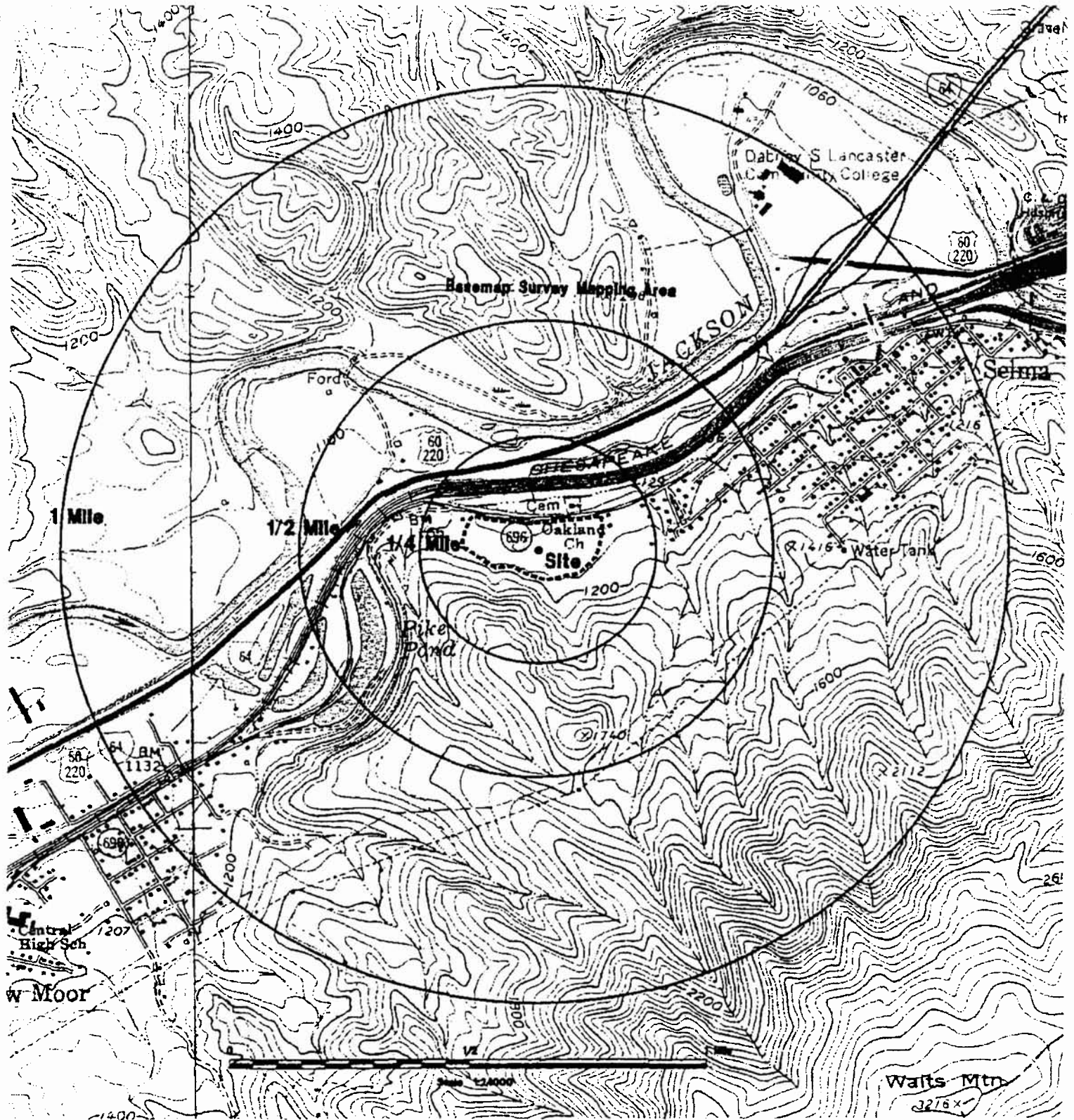
The site is considered protective in the short term. In order to achieve long term protectiveness, minor modification to the leachate collection trench must be completed to ensure that leachate within the trench is able to optimally flow and institutional controls must be implemented.

## **X. Next Review**

Since Site conditions do not allow for unlimited use and unrestricted exposure, EPA will need to conduct another five-year review of the Kim-Stan Landfill Site five-years from the signature date of this review.

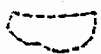
## **Attachments**

- |             |                           |
|-------------|---------------------------|
| 1. Figure 1 | Location Map              |
| 2. Figure 2 | Site Location Map         |
| 3. Figure 3 | O&M Sampling Location Map |

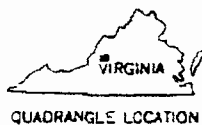


Source: USGS 7.5 Minute Series  
(Topographic) Quadrangles:  
Clifton Forge, VA 1982  
Photorevised 1986

#### Legend



Approximate Boundary of  
Landfill Source Area



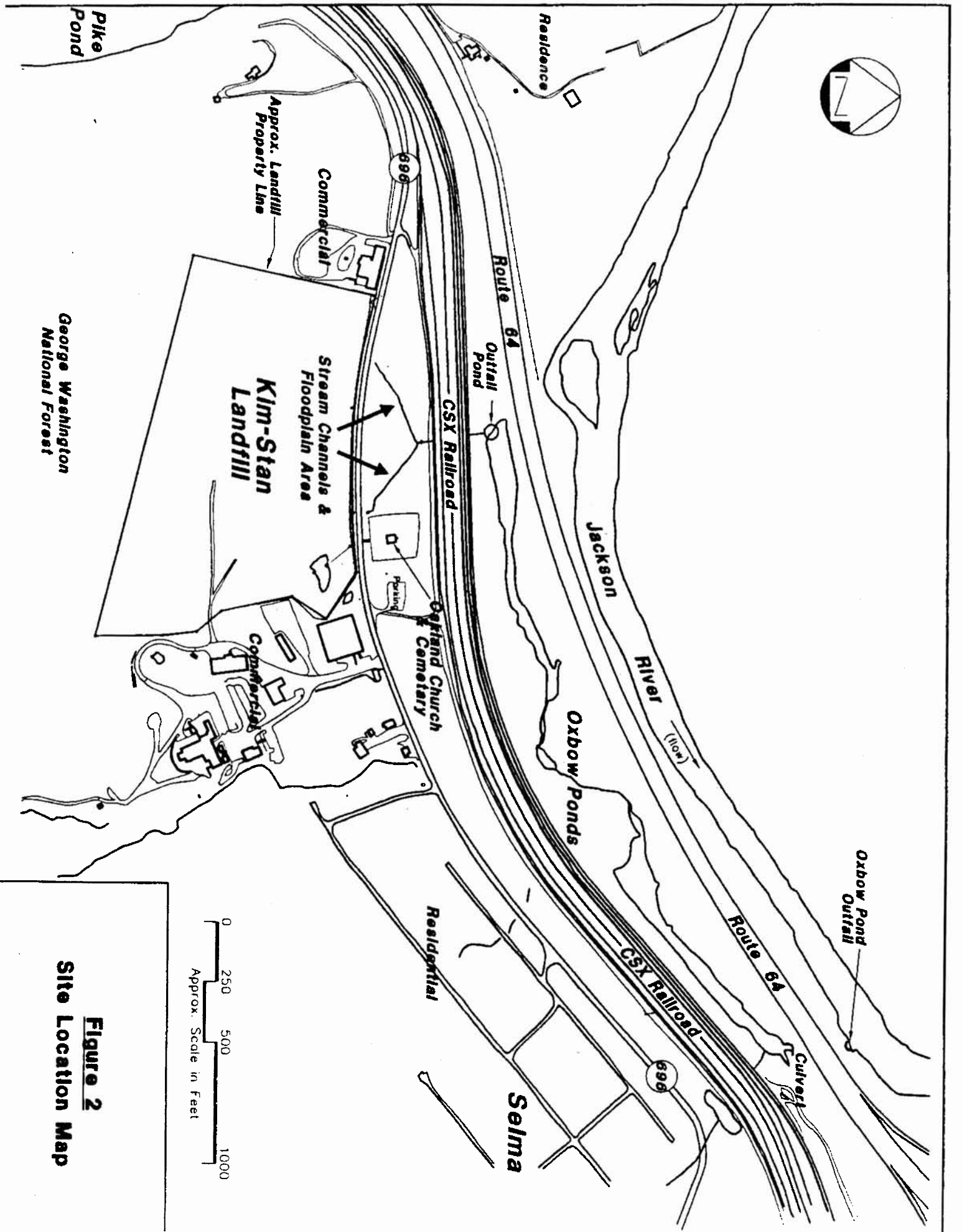
QUADRANGLE LOCATION

Site Coordinates:  
Longitude: -79 51 42 West  
Latitude: 37 48 01 North

Date 3/10/2000

**Figure 1**  
**Location Map**





**Figure 2**  
**Site Location Map**

